CLAIMS

1. A wear resistant sintered compact comprising:
about 10 to about 50 vol. % of cBN particles;
about 30 to about 50 vol. % of aluminum oxide;
about 1 to about 25 vol. % of an aluminum-containing material other than aluminum oxide; and
at least one material selected from the group consisting of carbides, nitrides, carbonitrides, borides and silicides of Groups IVa, Va, and VIa of the periodic table.

2. The sintered compact of claim 1, wherein the cBN particles are uniformly dispersed within the compact.

3. The sintered compact of claim 1, wherein the cBN particles are about 1 to about 15 microns in size.

4. The sintered compact of claim 1, wherein the at least one material in the binder comprises a Group IV metal.

5. The sintered compact of claim 1, wherein the at least one material in the binder comprises TiN, TiC, TiB_2, or TiCN.

6. The sintered compact of claim 1, wherein the aluminum oxide has a particle size of about 0.1 to about 5 microns in size.

7. The sintered compact of claim 1, wherein the compact comprises about 35 to about 45 vol. % of aluminum oxide.

8. The sintered compact of claim 1, wherein the compact comprises about 25 to about 50 vol. % cBN particles.

9. The sintered compact of claim 1, wherein the an aluminum-containing material comprises elemental aluminum, aluminum nitride, aluminum boride, or mixtures thereof.

10. The sintered compact of claim 1, wherein the cBN particles are coated with at least one layer of a carbide forming material.

11. A method for manufacturing a sintered compact comprising:

providing a mixture, wherein the mixture is at least substantially homogenous and comprises:

about 10 to about 50 vol. % cBN particles;

about 30 to about 50 vol. % aluminum oxide;

about 1 to about 25 vol % of a source of an aluminum-containing material that is not aluminum oxide; and

at least one material selected from the group consisting of carbides, nitrides, carbonitrides, borides and silicides of Groups IVa, Va, and VIa of the periodic table; and

sintering the mixture into a coherent body at a pressure of at least 3 GPa and a temperature above 1000°C.

12. The method of claim 11, wherein the cBN particles are about 1 to about 15 microns in size.

13. The method of claim 11, wherein the at least one material comprises a Group IV metal.

14. The method of claim 11, wherein the at least one material is selected from the group consisting of TiN, TiC, TiB_2, and TiCN.

15. The method of claim 11, wherein the aluminum oxide particles have a particle size of about 0.1 to about 5 microns.

16. The method of claim 11, wherein the mixture comprises about 35 to about 45 vol. % of aluminum oxide.

17. The method of claim 11, wherein the mixture comprises about 25 to about 50 vol. % of cBN particles.

18. The method of claim 11, wherein the cBN particles are coated with at least one layer of a carbide forming material.

19. A method of machining a cast iron material comprising:

machining a surface of a cast iron material with a tool comprising an abrasive body, wherein the abrasive body comprises:

about 10 to about 50 vol. % cBN particles;

about 30 to about 50 vol. % aluminum oxide;

about 1 to about 25 vol. % of an aluminum-containing material compound other than aluminum oxide; and

at least one material selected from the group consisting of carbides, nitrides, carbonitrides, borides and silicides of Groups IVa, Va, and VIa of the periodic table.

20. The method of claim 19, wherein the cast iron material comprises at least one of ductile iron, nodular iron, compacted graphite iron, grey cast iron, and a spin-cast grey iron.